

What is claimed is:

1. An atomic lithography apparatus for depositing atoms included in an atomic beam on a substrate to manufacture atomic structure comprising:

5 an atomic oven having a pin hole;

 a collimator having a pin hole for collimating an atom gas effused from the atomic oven to generate an atomic beam;

 lasers for irradiating laser beams on the atomic beam to control the divergence of the atomic beam;

10 lasers for forming an optical standing wave at a part of a space in which the atomic beam is propagated to control the propagation direction of the atomic beam;

 an electro-optic element for controlling the phases of the optical standing wave for controlling the propagation direction of the atomic beam to control the propagation direction of the atomic beam;

15 an electro-optic element drive device for controlling a voltage applied to the electro-optic element to control a refraction index of the electro-optic element; and
 a control device for controlling the electro-optic element drive device.

 2. The atomic lithography apparatus according to claim 1, comprising a shutter for blocking the atomic beam.

20 3. The atomic lithography apparatus according to claim 1, wherein laser beams for controlling the propagation direction of the atomic beam are constituted by laser beams which are perpendicular to the propagation direction of the atomic beam.

 4. The atomic lithography apparatus according to claim 2, wherein laser beams for

controlling the propagation direction of the atomic beam are constituted by laser beams which are perpendicular to the propagation direction of the atomic beam.

5. A method of manufacturing an atomic structure on a substrate comprising:

an atomic beam generation step for generating an atomic beam; and

5 a step for controlling an optical standing wave obtained by a laser by using an electro-optic effect to control the propagation direction of the atomic beam.

6. The method of manufacturing an atomic structure on a substrate according to claim

5, wherein

the atomic beam generation step includes:

10 an atom gas generation step for evaporating atoms in an atomic oven into atomic gas;

an atomic beam acquisition step for propagating the atomic gas through one pin hole to collimate the atomic gas; and, irradiating the laser beams on the collimated atomic gas to set the divergence of the atomic gas at not more than 1 mrad.

7. The method of manufacturing an atomic structure on a substrate according to claim

15 5, wherein

laser beams which are orthogonal to a plane perpendicular to the propagation direction of the atomic beam are utilized,

the optical standing wave is obtained by the two laser beams passing through the electro-optic element, and, by controlling the refraction index of the electro-optic element;

20 and

the propagation direction of the atomic beam is controlled by changing the phase of the optical standing wave.

8. An atomic lithography apparatus comprising:

an atomic beam generation means for generating an atomic beam consisting of gaseous atoms;

lasers for irradiating laser beams on the atomic beam generated by the atomic beam generation means to control the divergence of the atomic beam;

5 lasers for forming an optical standing wave at a part of a space in which the atomic beam is propagated to control the propagation direction of the atomic beam;

an electro-optic element for controlling the phases of the optical standing wave for controlling the propagation direction of the atomic beam to control the propagation direction of the atomic beam;

10 an electro-optic element drive device for controlling a voltage applied to the electro-optic element to control a refraction index of the electro-optic element; and a control device for controlling the electro-optic element drive device.

9. The atomic lithography apparatus according to claim 1, wherein four lasers are used for irradiating laser beams on the atomic beam to control the divergence of the atomic beam.

15 10. The atomic lithography apparatus according to claim 1, wherein two lasers are used for forming an optical standing wave at a space in which the atomic beam is propagated to control the propagation direction of the atomic beam.

11. The atomic lithography apparatus according to claim 3, wherein two laser beams which are perpendicular to the propagation direction of the atomic beam and orthogonally
20 arranged are utilized.

12. The atomic lithography apparatus according to claim 4, wherein two laser beams which are perpendicular to the propagation direction of the atomic beam and orthogonally arranged are utilized.

13. The method of manufacturing an atomic structure on a substrate according to claim 7, wherein two laser beams which are orthogonal to a plane perpendicular to the propagation direction of the atomic beam are utilized.